

**ORDER**

1050.18

**CHLOROFLUOROCARBONS AND HALON USE  
AT FAA FACILITIES**



**April 25, 1994**

**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION**

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## Foreword

Consistent with the Federal Aviation Administration's mission to be the national and international leader in aviation environmental issues, while fostering a safe, secure, and efficient aviation system, is the need for effective procedures to eliminate the use of ozone depleting substances in accordance with Title VI of the Clean Air Act Amendments of 1992. The chlorofluorocarbon (CFC) and halon phaseout program provides a comprehensive framework for ensuring that the FAA adheres to all applicable environmental regulations and best practices associated with refrigeration, degreasing, and other relevant activities while maintaining the necessary infrastructure to promote aviation safety and growth.

This order prescribes policy, delegates authority, and assigns responsibility for ensuring agency compliance with the provisions of the CFC and halon phaseout program. It also directs the Office of Environment and Energy to issue necessary guidelines and procedures needed to manage the program.

This order provides personnel who use refrigerants, solvents, and degreasers with direction for the procurement, use, management, and disposal of these substances. This order also provides direction for reporting current inventories of CFC's and halons, as well as equipment which utilizes these substances. Each office may supplement this broad coverage with guidelines or instructions specific to its needs.

Due to new findings and breakthroughs with regard to refrigerants, solvents, and degreasers, this order cannot remain static. Recognizing that improvement is a vital element in the program's effectiveness and responsiveness to FAA personnel, its users have the opportunity to offer suggestions for improvement to this directive through the use of FAA Form 1320-19, Directives Feedback Information.



David R. Hinson  
Administrator



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## CHAPTER 1. GENERAL REQUIREMENTS

### 1. PURPOSE

This order establishes Federal Aviation Administration (FAA) policies, procedures, responsibilities, implementation of the phaseout of, and guidelines for the maintenance of chlorofluorocarbons (CFC) and halons at FAA facilities pursuant to Title VI of the Clean Air Act (CAA) Amendments of 1990 and Environmental Protection Agency (EPA) regulations promulgated under Section 157 of the CAA (40 CFR 82).

### 2. DISTRIBUTION

This order is distributed to the director level in Washington, to the branch level in the NAS Transition and Implementation Service, Systems Maintenance Service, Offices of Environment and Energy, Acquisition Support, Aviation Medicine, and Budget; to the division level in the regions with a branch level distribution in the Airway Facilities and Logistics Divisions, to the division level at the FAA Technical Center; to the branch level in the Civil Aeromedical Institute; division level in the FAA Logistics Center and Facility Management Office of the Aeromedical Center; director/staff manager level at the Aeronautical Center; and to all Airway Facilities Sector Field Offices, Field Maintenance Parties, and Aircraft Maintenance Bases, to all Airway Facilities Sector Field Offices, Field Maintenance Parties, and Aircraft Maintenance Bases.

### 3. BACKGROUND

a. Chlorofluorocarbons (CFC) and halons are widely used as refrigerants, degreasers, and fire suppressants. These chemicals have been shown to deplete the earth's stratospheric ozone layer resulting in adverse environmental damage and health effects by exposing the earth to the sun's harmful ultraviolet radiation as well as contributing to global climate change. Growing concern over the depletion of the earth's ozone layer has led to the signing of the Montreal Protocol in 1987, an international agreement that regulates the use of CFC. This agreement has been ratified by 70 countries, including the United States, representing over 90 percent of the world's production capacity for CFC and halons. In support of the Montreal Protocol, the United States Congress passed the Clean Air Act (CAA) Amendments of 1990 (Public Law 101-549) which strictly regulate the manufacture, sale, and use of CFC's and other ozone depleting substances.

b. To implement the Montreal Protocol, EPA promulgated regulations under Section 157 of the CAA (40 CFR 82). This rule was promulgated on August 12, 1988, with an effective date of September 12, 1988. It established further prohibitions on

the production or importation of controlled substances, including CFC. Like the Montreal Protocol, this rule calls for a general reduction in the production and consumption of CFC's and other controlled substances, including methylchloroform and carbon tetrachloride. The rule requires 20-percent reduction by July 1, 1993, and 50-percent reduction by July 1, 1998.

c. On February 11, 1992, President Bush announced that the United States will unilaterally accelerate the phaseout of substances that deplete the earth's ozone layer. This announcement was made in light of recent scientific evidence obtained by the National Oceanographic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA) studies indicating that ozone depletion in the northern and temperate latitudes is much worse than it was originally thought to be. The President stated that all production of these substances—major chlorofluorocarbons (CFC), halons, methylchloroform, and carbon tetrachloride—will be eliminated in the United States by December 31, 1995. The EPA will adjust the existing phaseout schedule for these substances in order to comply with this deadline. Appendix 1, Statutory and Regulatory Requirements, contains an overview of Federal regulations concerning CFC's.

d. On December 10, 1992, EPA issued proposing regulations under Section 608 of the Clean Air Act. EPA's proposed regulations would: require service practices that maximize recycling of ozone depleting compounds (both CFC's and HCFC's) during the servicing and disposal of air conditioning and refrigeration equipment; set certification requirements for reclaimers and for recovery and recycling equipment; and establish safe disposal requirements to ensure removal of refrigerants from goods that enter the waste stream with the charge intact.

### 4. ACTION

a. After January 1, 1992, any FAA staff person repairing or servicing motor vehicle air conditioners in high-volume shops (i.e., those servicing more than 100 vehicles per year) must properly use refrigerant recycling equipment that has been approved by EPA. In addition, all such persons must be properly trained and certified in accordance with EPA-established criteria.

b. After January 1, 1993 (January 1, 1992, for low-volume shops that have not notified EPA of their activities), any FAA staff person repairing or servicing motor vehicle air conditioners in low-volume shops (i.e., those servicing fewer than 100 vehicles per year) must properly use refrigerant recycling equipment that has been

approved by EPA. In addition, all such persons must be properly trained and certified in accordance with EPA-established criteria.

c. After July 1, 1992, it will be unlawful for any FAA staff person to knowingly vent any class I or II substances, used as a refrigerant in an appliance, in a manner which permits the substance to enter the environment. Testing of halons is permitted during R&D programs aimed at the evaluation of alternate agents and the development of criteria for the new agents for usage during certification.

d. After November 15, 1992, the FAA shall not sell or distribute in interstate commerce any class I (chlorofluorocarbons, halons, carbon tetrachloride, and methylchloroform) or class II (hydrochlorofluorocarbons) substance suitable for use in a motor vehicle air-conditioning system in small containers (less than 20 pounds).

## 5. DEFINITIONS

This list of definitions pertains to this order and has been abstracted from Federal and private sources where appropriate. It should not be construed as comprehensive and is only for the purpose of clarifying terminology used in this order.

a. **Permissible Exposure Limit (PEL)** is a limit established by the Occupational Health and Safety Administration (OSHA), 29 CFR 1910.1000, that should not be exceeded. There are three types of PEL's:

- Time-weighted average is the employee's average airborne exposure that shall not be exceeded in an 8-hour workshift of a 40-hour workweek.
- Short-term exposure limit is the employee's 15-minute time-weighted average which shall not be exceeded at any time during a workday.
- Ceiling is the employee's exposure which shall not be exceeded during any part of the workday.

b. **ARI** is the Air-conditioning and Refrigeration Institute with headquarters in Washington, D.C.

c. **ASHRAE** is the American Society of Heating, Refrigerating & Air Conditioning Engineers, Inc., with headquarters in Atlanta, Georgia.

d. **Brazed Joint** is a gas-tight joint obtained by joining metal parts with alloys that melt at temperatures higher than 800 degrees F (430 degrees C) but less than the melting temperatures of the joined parts.

e. **Carbon Tetrachloride** was used extensively in the United States as a solvent and grain fumigant, and is still used in this capacity in many parts of the world. Carbon tetrachloride is still used as a feedstock in the United States

and, therefore, has been identified as a class I substance under Title VI--Stratospheric Ozone Protection--of the Clean Air Act. However, its high toxicity led to a ban of its use in the United States in most dispersive applications.

f. **Chillers** are heavy duty air conditioning systems in commercial and industrial buildings (e.g., air route traffic control centers). There are three types of chillers (reciprocating, screw, and centrifugal) distinguished principally by their compressors. Reciprocating compressors use pistons and cylinders for compression. Screw compressors most commonly use two intermeshing "screws" for compression. As they turn, the volume between the screws is reduced, compressing the refrigerant. Centrifugal compressors rotate at high speed, compressing refrigerant by centrifugal force.

g. **Chlorofluorocarbons (CFC)** are extremely stable, nontoxic, nonflammable, noncorrosive, and thermally efficient chemicals that are widely used as coolants for refrigeration and air conditioning systems, cleaning agents for electronic components, and foam blowing agents. CFC's are fully halogenated (no hydrogen remaining) halocarbons containing chlorine, fluorine, and carbon atoms.

h. **Class I Substances** are any CFC, halons, carbon tetrachloride, and methylchloroform deemed to fall in this category by the EPA Administrator based on current scientific data and pursuant to the Montreal Protocol, CAA, and EPA's implementing regulations. A complete list of class I substances is contained in Appendix 2--CFC's and CFC Alternatives.

i. **Class II Substances** are a wide variety of hydrochlorofluorocarbons (HCFC) considered by the EPA Administrator to fall within this category based on current scientific data and in compliance with the Montreal Protocol, CAA, and EPA implementing regulations. A complete list of class II substances is contained in appendix 2.

j. **Halons** are fully halogenated compounds that are effective fire extinguishing chemicals. They are electrically nonconductive, dissipate quickly, leave no residue, are explosive suppressants, and are nontoxic.

k. **Hazardous Waste** is defined in 40 CFR, Part 261.3. A waste is any solid, liquid, or contained gaseous material that is no longer used and is recycled or stored until there is enough time to treat or dispose of it properly. This waste becomes hazardous by virtue of being listed on EPA designated lists and/or having one or more of the following characteristics: ignitability, corrosivity, reactivity, or toxicity.



**l. Hydrochlorofluorocarbons (HCFC)** are types of CFC's that contain hydrogen atoms. Hydrogen reduces the stability of the CFC, allowing the CFC to break down more readily before reaching the stratosphere where it can damage the ozone. HCFC's also contain fluorine, chlorine, and carbon atoms.

**m. Hydrofluorocarbons (HFC)** are halocarbons that contain only fluorine, carbon, and hydrogen.

**n. Methylchloroform** (1,1,1-trichloroethane) is widely used throughout the world as an industrial solvent. Unlike other class I substances, it is only partially halogenated and correspondingly has a much lower ozone depletion potential (ODP). However, because of its high volume of use, it contributes significantly to total atmospheric chlorine levels.

**o. Motor Vehicle** is any self-propelled vehicle designed for transporting persons or property on a street or highway.

**p. Ozone Depletion** is the interruption of the naturally occurring ozone generation process. For instance, this occurs when CFC's and halons are released and rise into the stratosphere. Sunlight breaks down the CFC molecule, releasing a chlorine atom, or a bromine atom in the case of halons. Instead of a single oxygen atom combining with the oxygen molecule, the more chemically aggressive chlorine or bromine ions react with an oxygen atom to form chlorine monoxide or another compound which fails to block dangerous ultraviolet radiation. As this process continues, the ozone layer deteriorates, allowing more ultraviolet radiation to pass through and reach the earth's surface.

**q. Ozone Layer** is located 11 miles above the earth's surface and extends beyond 25 miles. Ozone molecules are continually generated as sunlight reacts with oxygen molecules to produce two single oxygen atoms. An oxygen molecule will then combine with a single oxygen atom to produce an ozone molecule. This process is balanced by a simultaneous reaction of ozone decomposing, due to sunlight, into an atom and molecule each of oxygen.

**r. Purging** is the removal of noncondensable gases from the cooling system.

**s. Purging Device** is an automatic, semi-automatic or hand-operated device which collects noncondensable gas from the condenser or receiver, condenses some of the condensable refrigerant, and relieves the remainder to the atmosphere.

**t. Reclaim** means to reprocess refrigerant to new conditions by means which may include distillation. It may require chemical analysis of the contaminated refrigerant to determine that appropriate process specifications are

met. This term usually implies the use of processes or procedures available only at a reprocessing or manufacturing facility.

**u. Recovery** means to remove refrigerant in any condition from a system and store it in an external container without necessarily testing or processing it in any way.

**v. Recovery Equipment** is normally a mechanical system consisting of an evaporator, oil separator, compressor, and condenser which draws refrigerant out of the refrigeration system and stores it in a storage container. The equipment may employ replaceable core filter driers to remove moisture, acid, particulates, and other contaminants.

**w. Recycle** means to clean refrigerant for reuse by oil separation and single or multiple passes through moisture absorption devices, such as replaceable core filter-driers, which reduce moisture, acidity, and particulate matter. This term usually implies procedures implemented at the field job site or at a local service shop.

**x. Solid Waste** is defined by the Resource Conservation and Recovery Act (RCRA), section 1004(27) as "discarded material including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities." Under this definition, contained gases, such as CFC's and HCFC's, are clearly solid wastes under RCRA and subject to the regulatory requirements of this Act. On the other hand, uncontained gases, not associated with solid waste management units, are outside of RCRA. However, as of February 5, 1991, EPA suspended these requirements for refrigerants, which exhibit these characteristics and which are recycled, for fear that they might otherwise encourage venting as a means of avoiding this responsibility. EPA is currently studying the issue of CFC's as solid and hazardous waste. See appendix 1.

## 6. REPORTING

In cooperation with sector personnel, each region and center shall submit information on CFC usage as part of its annual facilities environmental compliance report to AEE-1 by February 15 of each calendar year. This information is necessary to manage the CFC phaseout program as well as the inventory of diminishing CFC's, HCFC's and other affected substances. This report shall include the name of the current environmental coordinator, an inventory of CFC, HCFC, halons, carbon tetrachloride and methylchloroform supplies, and an inventory of equipment using these chemicals. This report should include any major changes which may have occurred during the previous calendar year, such as procurement

of new equipment and replacement of old equipment, modifications to existing equipment, conversion to new refrigerants, and transportation or disposal of refrigerants.

In cooperation with the sector personnel, each region and center shall designate an individual as a Regional Program Manager for Environment and Safety. The responsibility of the coordinator will be to assemble the required inventories and records, provide interpretation of State and local regulations, and ensure budget submissions for operational requirements and F&E are submitted.

## 7. STATE AUTHORITY

Approximately 70 CFC-related bills have been introduced in 21 States. Several States have enacted CFC-related laws. While States may develop more stringent standards than those required at the Federal level, they can in no manner be less strict than Federal standards. Where State law does not exist, Federal standards will apply. Thus, with regard to the development of CFC policy, FAA regional and sector personnel shall consult with local and State authorities.

## 8. POLICY

It shall be FAA policy to comply with all procedures and policies of the Clean Air Act Amendments of 1990 as well as EPA implementing regulations (e.g., 40 CFR 82 and 261). FAA shall comply with all State, interstate, and local requirements, administrative authorities, processes, and sanctions in the same manner and to the same extent as any nongovernmental entity.

## 9. RESPONSIBILITIES

Compliance with the policies and procedures of this order is the responsibility of the offices, services, regions, sectors, and centers.

**a. Deputy Regional Administrators or Deputy Directors for the FAA Technical and Aeronautical Centers** are responsible for coordination of cross-divisional and cross-regional environmental matters and for overseeing regional environmental activities. In cooperation with sector personnel, each region and center shall designate an individual as a Regional Program Manager for Environment and Safety. It will be the responsibility of the coordinator to assemble the required inventories and records, provide interpretation of State and local regulations, and ensure budget submissions for operational requirements and F&E are submitted. It shall be the responsibility of the region/center to determine the method of training as well as scheduling training. All applicable maintenance technicians shall be trained within 1 year of issuance of this order.

**b. The Aeronautical Center and the FAA Technical Center (AMP-1 and ACM-400)** are responsible for ensuring that the direction provided in this order is followed in the maintenance of current equipment,

the retirement of old equipment, and the procurement of new equipment. AMP-1 and ACM-400 must perform this function.

**c. The Aeronautical Center** shall incorporate the directives of this order in the procurement and storage of all related equipment. The FAA Logistics Center (AML-1) shall make every effort to procure and supply alternatives to CFC products.

**d. The Office of Budget (ABU)** shall use this order as the basis for developing the annual call for estimates related to costs required for compliance with CFC regulations initiated by Federal, State, and local authorities.

**e. The System Management Service (ASM) and the Regional Airway Facilities Divisions with the assistance of the Logistics Center** shall review and revise staffing standards for the additional workload, and provide for training and licensing or certification, as required by regulating authorities. The AXX-400's and AF sectors are responsible for submitting yearly operational budget amounts sufficient to maintain existing CFC-utilizing equipment and installation of needed replacement equipment. ASM and its counterparts in the regions, centers, and field provide logistical support, to include recapturing, reusing, storing, disposing, and transporting of CFC's, halons, CFC-containing solvents, and CFC-containing items or equipment in an EPA or State approved manner.

**f. Airway Facilities (AF)** is responsible for development of implementation procedures that will incorporate the requirements of this order into the development of the NAS. ANS shall be forward in its approach by considering the impact of this order on the design of new systems, replacement of all equipment, and maintenance of existing equipment. Responsibilities include: annual budget requirements; implementation programs; regional training; equipment and chemical changeout; purchase of recovery and recycling equipment; and revision of maintenance directives to facilitate maintenance practices that are consistent with the new requirements.

**g. The Office of Environment and Energy (AEE)** is responsible for the overall review of FAA compliance with the provisions of 40 CFR Part 82; development of policies for implementing 40 CFR Part 82; provision of assistance to offices, services, regions, and centers in development of guidelines and procedures for their program areas; interpretation of policies established in this order in consultation with the responsible officials in the EPA; providing advice to responsible officials in FAA concerning changes in EPA policies relative to CFC and CFC items in the National Airspace System (NAS); and other responsibilities as defined elsewhere. AEE is

responsible, for developing and maintaining an official inventory of CFC, halons, and solvents. Copies of implementing instructions to be provided by FAA organizational elements will be reviewed for consistency with agency policy.

**h. NAS Transition and Implementation Service (ANS)** is responsible for development of implementation procedures that will incorporate the requirements of this order into the development of new equipment and facilities for the NAS. ANS shall anticipate accordingly the impact of this order on the design of new systems, as well as a national program for the replacement of old equipment, and the retrofitting of existing equipment. Responsibilities include: annual F&E budget requirements for implementation programs; regional training; equipment and chemical change out; and the purchase of recovery and recycling equipment.

**i. Associate Administrator for Contracting and Quality Assurance** provides acquisition and quality assurance support, and its counterparts in the regions and centers provide acquisition support.

**j. The Office of Aviation Medicine and Regional Aviation Medical Divisions**, in their respective areas, are responsible for reviewing reports received from the Regional/Center Occupational Safety and Health Managers on CFC, HFC, HCFC, and halon handling, providing medical guidance in the development of criteria for the safe handling of CFC's, halons, and HFC and HCFC items, determining safe exposure levels with regard to potentially toxic CFC's, and establishing a program (including budget requirements) for periodic physical examinations of those persons who may or have had extensive contact with potentially toxic CFC's. AAM-700 is also responsible for developing the FAA Respiratory Protection Program.

**k. Airway Facilities Regional Program Managers for Environment and Safety (RPMES) and Center Environment and Safety Managers** are responsible for: reviewing field reports received for evidence of unsafe or unhealthy CFC handling procedures; reporting those types of inadequate CFC handling procedures to their Regional Flight Surgeon; and providing copies of instructions to FAA employees so that approved procedures can be followed. Health and safety personnel shall follow Occupational Safety and Health Administration (OSHA) guidelines concerning acceptable exposure levels (PEL) for CFC and HCFC. They should consult with the regional Flight Surgeon in determining what levels are for different substances.

**l. Office of Aviation System Standards (AVN)** shall determine the application of this order to FAA-owned and -maintained aircraft with regard to air conditioning units, fire extinguishers, solvents, and degreasers. The

requirements of this order shall become incorporated in all maintenance manuals for FAA aircraft. In maintaining current systems, disposing of old ones, and acquiring new ones, the provisions contained in this order shall apply.

**m. Washington Flight Program Staff (AVS-60)** shall determine the application of this order to all FAA-owned and -maintained aircraft at National Airport with regard to air conditioning units, fire extinguishers, solvents, and degreasers. The requirement of this order shall be part of all maintenance procedures and shall apply to the disposal of old systems and the acquisition of new ones.

**n. FAA Academy (AMA-1)** at the Aeronautical Center shall ensure that all existing courses designed for training technicians in the installation and maintenance of chillers, refrigeration units, and fire extinguishing systems are revised to incorporate the requirements of this order. The Academy shall update the FAA Air Conditioning course 40114 to meet the new requirements of the CAA on recovery and recycling methods. The on-the-job (OJT) II Air Conditioning Instruction Manual shall be revised to reflect updated information regarding demonstrated proficiency of technicians to properly use recovery and recycling equipment. Documentation of training shall be recorded in personnel training files.

**o. Office of Training and Higher Education (AHT)** shall ensure that FAA training is updated to include maintenance practices required to comply with EPA requirements. AHT should also arrange for purchase of equipment necessary to support training.

**p. Executive Director for Acquisition and Safety Oversight (AXQ)** is responsible for ensuring that acquisition policy, oversight, testing, and evaluation procedures are in accordance with EPA requirements.

**q. The Office of Facility System Engineering (AFE)** is responsible for facility system development and integration that will incorporate the requirements of this order in the development of the NAS facilities. AFE will consider the impact of this order on the equipment specifications of new systems and their integration with the new or existing facilities including cost benefit analysis.

**r. The Operational Support Service (AOS)** is responsible for revising existing maintenance directives to facilitate operational practices that are consistent with the new requirements for equipment. AOS is responsible for maintenance of existing equipment and revision of maintenance directives to facilitate maintenance practices that are consistent with the new requirements. The National Airway Systems Engineering Division (AOS-200) is responsible for modification of maintenance directives and documentation.

s. **Chief Counsel and Regional Assistant Chief Counsels** shall be responsible for providing advice and counsel to facilitate compliance by FAA offices.

#### 10. AUTHORITY TO CHANGE THIS ORDER

a. The Administrator reserves the authority to approve changes which establish policy, delegate authority, or assign responsibility.

b. The Director of Environment and Energy may issue changes to this order for compliance with the latest EPA policy related to chlorofluorocarbons and other ozone-depleting substances. Changes in 40 CFR Part 82 that take effect after the issuance of this order shall take precedence over any part of this order with which it corresponds or conflicts. The Office of Environment and Energy will advise the responsible FAA components of such changes to 40 CFR Part 82 as soon as these changes are known.

c. Changes proposed by an organizational element within FAA must be submitted to AEE. AEE will oversee the coordination of the change to the appropriate approval authority and ensure final processing authority.

#### 11. FUNDING AND BUDGET REQUEST PROCEDURES

All organizations affected by this order shall submit a fiscal year budget item for the management of all ozone-depleting substances (e.g., methylchloroform, carbon tetrachloride, CFC's, HCFC's, and halons) and related equipment. The estimate shall cover yearly costs for: recovery, recycling, and reuse of CFC's and CFC substitutes (e.g., HCFC's); the phaseout of halon containing fire extinguishing equipment; the shift from industrial solvents and degreasers containing CFC's; and the replacement of older CFC containing chillers and air conditioning units. Transportation and storage costs should also be part of the annual estimate. It is the responsibility of each region and center to submit a yearly budget on the costs associated with compliance with CFC regulations (40 CFR Part 82), as required in the Annual Call for Estimates (FAA Order 2500.244) and the Operations Appropriation Call for Estimates (FAA Order 2500.10R).

a. **Operations Budget Requirements.** This paragraph contains recurring costs associated with the continuance of compliance with CFC regulations. AAF will be responsible for budgeting new equipment, and ASM will be responsible for budgeting for maintenance. The requirements which shall be considered under the operations budget are:

- (1) Recapture, recycle, and reuse,
- (2) Reporting, permits, licenses, records, and certification,

(3) Disposal of ozone-depleting substances and related equipment,

(4) Increased travel costs for service,

(5) Transportation of ozone-depleting substances,

(6) Higher costs of all refrigerants,

(7) Revising staffing standards to reflect increased service times,

(8) Early replacement of existing systems,

(9) Potential increased energy costs,

(10) Repair of recovery and recycling equipment.

b. **Facilities and Equipment (F&E) Budget Requirements.** The requirements which shall be considered under the F&E budget are:

(1) Replacement of older equipment containing ozone depleting substances with modern equipment capable of containing acceptable substitutes,

(2) Purchase of recovery and recycling equipment,

(3) Removal and disposal of old equipment, and

(4) Purchase of equipment room monitoring devices.

Include within the scope of any routine modernization or relocation projects the replacement of substances containing ozone-depleting equipment and any environmental cleanup measures.

#### 12.-19. RESERVED

## CHAPTER 2. FAA EQUIPMENT

### 20. EXISTING EQUIPMENT

a. FAA's centrifugal chillers contain the greatest volume of the CFC's R-11 and R-113 (CFC's with a high ozone depletion potential).

b. Chillers have an average useful life of 20 to 27 years. New chillers designed to accept substitute chemicals such as HFC-134a are available and cost approximately the same as CFC chillers.

c. Manufacturers will continue to produce CFC refrigerants until the year 1996 and will probably continue to manufacture CFC utilizing equipment well past the year 1996 or at least until substitutes are available.

d. The largest volume of HCFC-22 can be found in FAA air conditioners such as window and central type units. HCFC-22 is not being phased out of production until the year 2015 and therefore is not an immediate concern.

e. Refrigerant R-12 is another CFC that is very commonly found in FAA equipment, such as drinking fountains, refrigerators, air driers for pneumatic control systems, freezers, coolers, and ice machines. One unique application of R-12 is for ASR-8 waveguide pressurization.

f. To satisfy maintenance requirements specified in chapter 3 of this order, a modification shall be implemented to replace the R-12 used for ASR-8 waveguide pressurization with a non-CFC agent.

g. Other high volume nonrefrigerant CFC's used in FAA equipment are halon 1211 and 1301. Halon 1211 is primarily used in portable fire extinguishers. Halon 1301 is used in total flooding fire protection systems at ARTCC's, TRACON's, FSS's, and some office areas (some FSS and office total flooding systems may be in leased space and not FAA maintained).

### 21. EQUIPMENT REPLACEMENT/ MODIFICATION

a. All equipment will eventually be replaced or modified. However, a study completed by EPA revealed that approved recycling and reuse practices are more economical than retrofitting or replacing equipment prematurely.

b. Relatively new equipment using CFC's and HCFC's as refrigerants that are expected to remain in service beyond the year 1996 shall be scheduled for modification to use a non-CFC refrigerant. Please note that conversion of equipment to use replacement refrigerants may require modification of mechanical room ventilation and alarms.

c. Technological advances in the manufacture of CFC substitute chemicals, equipment modifications, availability, and cost are all factors that shall be considered on a case-by-case basis.

d. When a major equipment failure occurs or is imminent, replacement with non-CFC equipment shall be practiced unless no acceptable alternatives are available.

e. Enhanced containment modifications shall also be considered for existing CFC low pressure (vacuum) operated chillers.

f. High efficiency purge units shall be installed on existing equipment. For existing equipment, the installation of high efficiency purge units shall be required to mitigate potential losses of refrigerant vapor to the atmosphere.

g. Halon total flooding systems shall remain in place as is until non-CFC substitutes are available or be replaced with sprinkler systems in accordance with FAA Order 1600.54.

h. Release testing of halon shall not be performed. Testing of halons is permitted during R&D programs aimed at the evaluation of alternative agents and the development of approval criteria for the new agents for usage during certification.

i. Halon shall be weighed only to determine serviceability.

j. Portable halon fire extinguishers shall be scheduled for eventual replacement.

### 22. NEW EQUIPMENT

a. The production phaseout schedule of CFC and HCFC refrigerants shall be considered when purchasing new equipment.

b. Any new refrigeration, air conditioner, or chiller purchases shall accept CFC substitutes (e.g., HCFC-134a, HCFC-22, or HCFC-123).

c. Currently, chillers are available which operate on CFC's and can be converted to HCFC's. Several major producers now have a chiller designed to operate on HCFC-123.

d. All new chillers shall be designed to recapture refrigerants. In other words, they shall have an automatic purge unit that efficiently separates noncondensables from refrigerant and returns the refrigerant to the system.

e. Substitute refrigerants being proposed have reduced efficiency ratings compared to refrigerants presently in use. This means that, when these substitutes are used, capacities will decrease and power requirements will increase from original equipment ratings.

f. States have legislation in process or approved to control CFC usage, venting, and disposal. Many of these State laws will be as strict or stricter than EPA Federal laws.

g. Any refrigeration and air conditioning equipment being procured through GSA, special contract, or local purchase shall comply with all Federal and/or State requirements.

**23.-29. RESERVED**

## CHAPTER 3. MAINTENANCE PROCEDURES

### 30. GENERAL

The purpose of this chapter is to require certain practices and procedures that will eliminate voluntary and prevent involuntary release of CFC and HCFC refrigerants and halon during installation, operation, maintenance, and disposal of refrigeration, air conditioning, and fire protection equipment/systems.

### 31. DISCONTINUED PRACTICES

Previous maintenance practices have allowed CFC's and HCFC's to be released to the atmosphere. Following is a list of maintenance practices that shall be changed:

- a. Routinely adding refrigerant instead of repairing small leaks.
- b. Burn-out clean-up procedures.
- c. Release of refrigerant to atmosphere during maintenance procedures.
- d. Disposal of "empty" one time refrigerant containers.
- e. Venting of hoses when taking pressure readings.
- f. Poor design characteristics of purge systems.
- g. Any replacement of parts in the refrigerant system.

### 32. IMPROVED MAINTENANCE PRACTICES

The FAA must evaluate procedures that are currently being employed in the operation and maintenance of refrigeration systems. Consideration should be given to the ramifications of an escalating tax on CFC's (\$1.37 now and \$4.00 in 1999), plus the near certain possibility of a complete phaseout of CFC's by the year 2000. These new procedures are necessary to preserve the earth's ozone layer and to ensure that maintenance procedures are in compliance with regulatory requirements.

### 33. CONSERVATION OF REFRIGERANT

The following are some suggested practices to conserve refrigerant:

- a. Discontinue past wasteful uses of refrigerants (e.g., venting, purging, replacing when reusable). As of July 1, 1992, it became unlawful to vent or purge any CFC into the atmosphere.
- b. Take extra care to vacuum check new systems, and conduct a deep vacuum before charging to ensure against leaks.
- c. Take the time to make quality brazed joints, and where flared fittings are required, make them proper.

d. Become adept at operating good quality leak detecting equipment and using it routinely.

e. Find system leaks and repair them, rather than continuing to top off the refrigerant charge periodically.

f. Properly maintain centrifugal compressors and purge systems.

g. Keep accurate logs of refrigerant usage and utilize this information in locating leaks.

### 34. NEW MAINTENANCE PROCEDURES

The following maintenance procedures shall now be used to ensure the minimum discharge of refrigerants to the atmosphere:

a. Refrigerant shall not be used to clean up a system after motor/compressor burnout.

b. Pressurization of nonrefrigeration type systems shall not be accomplished with CFC's or HCFC's when there is a suitable substitute.

c. Use a minimum amount of refrigerant in conjunction with dry type nitrogen to develop pressure at 150 psig so that a halide gas leak detector can be used.

d. Use newer leak detection technology such as ultraviolet detectors.

e. Annual visual inspections of equipment and monthly inspections of seals and gaskets shall be performed to minimize potential releases of refrigerants.

f. When a leak is detected, that part of the system shall be isolated to minimize the loss of refrigerant.

g. Recover and recycle all refrigerants using approved removal and recycling equipment. If total cleanup of refrigerant is not possible for future use, disposal of used contaminated refrigerant shall be through approved disposal procedures.

h. When non-reusable bottles are empty of liquid refrigerant, evacuate the refrigerant gas from the bottle with removal and recycling equipment until the pressure in the bottle reads zero psig or less.

i. Install refrigerant isolation valves in equipment to facilitate servicing by limiting release of the charge when repairing or replacing components such as filters.

### 35. GENERAL TRAINING REQUIREMENTS

The revised Clean Air Act of 1990 requires all personnel who maintain or repair CFC-utilizing equipment to be properly trained in current recycling practices. All employees who work with HFC's/HCFC's and CFC's shall

receive training in accordance with 29 CFR 1910.1200. Additionally, inspectors and technicians shall have improved training to detect minute leakage of CFC/HCFC resulting from cracked, broken, or defective components in the system and to verify proper operation and use of recycling equipment. Additionally, employees who come in contact with or ship CFC's or halons shall receive Hazardous Materials Training in accordance with the requirements promulgated in 49 CFR 172.700.

### **36. INSPECTION AND MONITORING**

It shall be the responsibility of the regions to include an inspection program to ensure that maintenance personnel and maintenance practices meet the requirements of this order.

### **37.-39. RESERVED**



## CHAPTER 4. RECOVERY, RECYCLING, AND REUSE OF CFC's/HCFC's

### 40. GENERAL

Standards and requirements will soon be in place that will dramatically change the way we use and dispose of refrigerants and other products containing CFC's/HCFC's. The FAA must be prepared to meet these requirements in the area of recovery, recycling, and reuse of CFC's. This chapter will describe the recovery, recycling, and reuse requirements and technology available today.

### 41. NEW REQUIREMENTS

a. Effective July 1, 1992, it was unlawful to knowingly vent any class I or II substance, used as a refrigerant in an appliance, in a manner which permits the substance to enter the environment. Testing of halons is permitted during R&D programs aimed at the evaluation of alternative agents and the development of approval criteria for usage during certification.

b. At this time, no certification is required to perform recycling maintenance on FAA facility systems or non-motor vehicle equipment. However, training will be required for FAA technicians working with FAA facility refrigeration systems so that they are proficient at operating recycling equipment.

c. Recovery, recycling, and reuse of CFC's/HCFC's shall be practiced during routine and corrective maintenance of all refrigeration and air conditioning equipment containing these chemicals.

### 42. RECOVERY, RECYCLING, AND REUSE PROCESSES

a. Recovery is a term that describes the removal of refrigerant from a refrigerant system. This system may or may not be operational, but in any case, it is necessary to remove refrigerant for routine and corrective maintenance. In the past, it was standard practice to release refrigerant to the atmosphere during certain maintenance procedures.

b. It is now required to recover refrigerant during maintenance practices and prior to disposal of old equipment.

c. Recycling equipment is normally a mechanical system consisting of an evaporator, oil separator, compressor, and condenser which draws refrigerant out of the refrigeration system and stores it in a storage container. The equipment may employ replacement core filter driers to remove moisture, acid, oil, and other contaminants.

d. Recycling equipment also requires maintenance when changing replaceable core filter driers contained within the recovery equipment. The section containing the

filter shall be isolated and the refrigerant captured into an approved storage container prior to opening the filter shell. Filters or strainers removed from recycling equipment shall be considered a hazardous waste and managed in accordance with chapter 5 of this order.

e. Recycling equipment and filters shall be maintained to the recycling equipment manufacturer's specifications.

f. With regard to reuse, refrigerant that has been withdrawn from equipment can usually be returned to the equipment without reprocessing. If there is a question about the quality of the refrigerant, it should be analyzed for acids, moisture, high boiling point, residue, and other contaminants before it is reused.

g. Proper evacuation and charging procedures (as outlined in ASHRAE guideline 3-1990, chapters 6, 7, 8 and 12; ASHRAE Handbook 1986 Refrigeration Volume, chapter 7, - "Moisture and Other Contaminant Control in Refrigerant Systems", and ARI Standard 700-88, "Specifications for Fluorocarbon Refrigerants") shall be followed when returning the refrigerant to the system.

h. Fresh filter drier elements shall be installed before returning the refrigerant to the system.

i. When a system has been taken out of service because of motor burnout resulting in refrigerant contamination, the refrigerant shall be analyzed for contaminants and recycled prior to reuse. The recycling may involve only filtering and drying the refrigerant or it may involve distillation to remove physical and chemical contaminants. Distillation is not normally done with recycling equipment used for maintenance. Therefore, an approved reclamation company may be necessary.

j. When refrigerant is to be reused in another system that is similar in function and components, the refrigerant may be recycled using appropriate equipment that is approved to remove those contaminants known to be generated in that type of system.

k. Reuse of mixtures of refrigerant and inert gases that are used for leak testing will require them to be recycled prior to reuse. These mixtures shall be withdrawn from equipment prior to charging with refrigerant and shall be stored for future use as a leak test gas.

l. If the leak test gas has become contaminated, particularly by moisture, it shall be filtered and passed through a drier before being injected into a system.

**43. RECOVERY/RECYCLING EQUIPMENT**

a. Funding for initial recycling units has already been approved, and the procurement process has begun at the Washington level. Future budget submissions will need to be submitted by each region/center for additional equipment through the Annual Call for Estimates.

b. A variety of recycling units are available on the market. Features recommended include:

- (1) low and high pressure cut-off controls,
- (2) filters that are easily replaceable,
- (3) space for external storage tank connection,
- (4) sight glasses to monitor oil,
- (5) automatic air purging,
- (6) portability, and
- (7) ability to handle multiple refrigerants.

c. Equipment shall also be able to clean refrigerants to industry standards and shall be certified by a test laboratory.

d. A separate unit to recycle the low pressure refrigerants (R-11, -113, -114, -115) may also have to be provided to the locations with centrifugal chillers if a single unit cannot be purchased to satisfy both needs.

**44. TYPICAL RECOVERY/RECYCLING UNIT**

The recovery/recycling unit shall remove moisture, oil, and acids from the refrigerant. To do this, the typical unit is equipped with a replaceable filter drier, heat exchanger/oil separator and sub-cooler sections to condense the refrigerant into a liquid for storage or return to the system being serviced. The recovery/recycling unit is typically connected to a system through a standard manifold set and operates on 120VAC.

**45.-49. RESERVED**

## CHAPTER 5. DISPOSAL OF CFC's AND CFC-CONTAMINATED MATERIAL

### 50. RCRA APPLICABILITY

a. Regulations promulgated pursuant to Subtitle C of the Resource Conservation and Recovery Act (RCRA) (42 U.S.C., 6901) apply to any discarded materials that are solid wastes (including solids, liquids, semisolids, and contained gases), as defined in 40 CFR 261.2. Contained gases being discarded, including used refrigerants, are considered spent materials and are solid wastes subject to RCRA regulations according to 40 CFR 261.2.

b. Thus, the disposal of CFC's is governed under the framework of the RCRA "cradle to grave" system. RCRA regulations are designed to provide control of hazardous waste by imposing requirements on generators and transporters of hazardous wastes, as well as upon owners and operators of treatment, storage, and disposal facilities (TSDF).

c. RCRA was amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA). These amendments made far-reaching changes to the RCRA regulatory program. Significant new requirements include the Land Disposal Restriction (LDR) regulations and newly identified hazardous wastes. Hazardous waste and material regulations are established in CFR Titles 40 and 49; the occupational safety regulations are set forth in CFR Title 29.

d. FAA personnel engaged in the disposal of CFC's or CFC-containing substances shall follow RCRA regulations contained in 40 CFR Parts 260-268. See AEE-20 Hazardous Property Management Manual for guidance in managing hazardous materials and hazardous wastes.

e. When disposing of CFC's or CFC-containing substances, FAA personnel shall do so through an EPA-permitted TSDF. If CFC's are classified as hazardous waste, then stricter disposal regulations apply and the CFC's must be assigned an EPA waste code before they can be transported off-site (40 CFR 262.12).

f. However, disposal shall only be considered as a final option when the recapture and recycling/reuse of the CFC's, or the trading and selling of CFC's, is no longer a viable alternative.

g. Given the increasing scarcity of CFC's, one option will be to sell or trade CFC's in the waste exchange market or to sell them to users who have a demand for them. Records of sales of CFC's shall be kept on file indefinitely.

### 51. CFC's AS HAZARDOUS WASTE

a. The Federal regulations list more than 400 wastes as hazardous (40 CFR 261, Subpart D). These wastes are broken down into four lists, U, P, K, and F (40 CFR 261.33(f), .33(e), .32 and .31). Whenever a waste is generated, the operator must review the lists to determine whether the waste is listed as hazardous.

b. Under the current hazardous waste identification and listing regulations (40 CFR 261), a CFC waste is hazardous only under the circumstances outlined. Four cases exist where a CFC waste would be considered hazardous:

(1) When dichlorofluoromethane (CFC-12) or trichloromonofluoromethane (CFC-11) is an unused commercial chemical product or an off-specification commercial chemical product (including inner liners, containing residues, or spill residues), the material is considered a hazardous waste when discarded, except when sent off-site for recycling. For the purposes of this subsection, the term "unused" means not introduced into a process, activity, or piece of equipment for use. The term "off-specification" shall mean not meeting the physical or chemical standards set by the product manufacturer. The EPA listings for CFC-12 and CFC-11 are U075 and U121, respectively.

(2) When a CFC waste is covered by a spent solvent listing (F001-F005), the waste is considered hazardous. Any CFC solvent used for degreasing would be considered a hazardous waste. Trichloromonofluoromethane (CFC-11) and 1,1,2-trichloro-1,2,2 trifluoromethane used as solvents are considered hazardous wastes. Furthermore, any spent solvent mixture containing CFC's and meeting one of the F001-F005 solvent listings is considered a hazardous waste. For example, a spent solvent mixture containing 10 percent trichlorofluoromethane, 5 percent ethyl ether, and 5 percent acetone before use would meet the F002 and F003 listings.

(3) If a CFC waste exhibits a characteristic of a hazardous waste (i.e., ignitability, toxicity, reactivity, and corrosivity, see 40 CFR 261.21-261.24), the waste would be considered hazardous. However, if a CFC waste is hazardous by virtue of the toxicity characteristic and is destined for recycling, it is exempt from RCRA regulations (40 CFR 261.4 (b) (10-12).

(4) Finally, if a CFC waste is mixed with a hazardous waste, the entire mixture would be a hazardous waste.

c. Filters that are used in the recycling process shall be considered hazardous waste upon removal from the recycling unit. Contamination levels shall be determined as stipulated below.

d. In order to determine the level and type of contamination to recycling filters, an initial laboratory test shall be performed on a sample filter or filters. This need not be conducted on each and every filter used over the life of the equipment. Rather, once an initial baseline test has been performed to determine filter contamination levels, extrapolation from these results may be conducted to estimate future filter contamination levels. This approach can only be followed if system filters are replaced in a consistent and routine fashion. These results can only apply to a specific system in a given geographic area. If filters are not replaced on a regular basis, then the results of the baseline test will not be valid for future filter replacement. A log of filter replacement shall be kept in order to document this approach for regulatory agencies, such as the EPA, should any questions or concerns arise.

e. When a used CFC refrigerant is determined to be a hazardous waste, the owner of the refrigerant system from which it was removed would be considered the generator. In addition, the service person or company that removed the refrigerant from the system would be considered a co-generator. Although parties are subject to RCRA hazardous waste regulations, EPA prefers that the generator responsibility lie with one party, preferably specified in a contract or written agreement.

f. When a CFC refrigerant or solvent is determined to be hazardous waste, it shall be subject to the provisions of the Resource Conservation and Recovery Act (RCRA) and EPA's implementing regulations (40 CFR Parts 124, 261-65, and 270). See the AEE-20 Hazardous Property Management Manual for guidance in meeting these regulatory requirements.

**52.-59. RESERVED**

## CHAPTER 6. MOTOR VEHICLES AND AIRCRAFT

### 60. GENERAL

a. Regulations for servicing motor vehicle air conditioners (MAC) are very specific and stringent and require compliance by January 1, 1992. The rationale for these stringent requirements is based on data that identify MAC equipment as a major source of CFC emissions into the atmosphere. These systems use R-12, which is one of the worst ozone-depleting substances and can remain active for 40-150 years.

b. The intent of the Clean Air Act (CAA), as amended, is to require recycling of refrigerant in MAC's whenever service is being performed to prevent release of refrigerant into the atmosphere. The CAA requires persons who repair or service MAC's to be certified in refrigerant recovery and recycling and to properly use certified equipment when performing service.

c. However, small-volume shops typical of FAA operations (i.e., those servicing fewer than 100 vehicles per year) were given until January 1, 1993, to comply with these regulations (40 CFR 82). Documentation should be kept to verify to EPA that service was performed on fewer than 100 vehicles.

### 61. MOTOR VEHICLE AIR CONDITIONERS (MAC)

Following is an overview of MAC regulation requirements.

a. **Clean Air Act Amendments of 1990.** The CAA requires persons who repair or service MAC units to be certified in refrigerant recovery and recycling and to properly use certified equipment when performing service. It also prohibits the sale of containers of class I and class II substances under 20 pounds except to certified technicians.

b. **Recycling.** Recycling of refrigerant in MAC's is required whenever service is being performed that may release refrigerant to the atmosphere. This includes all persons who are paid to perform service on MAC's. "Do-it-yourself" repair of MAC's is not effectively restricted by the CAA. Congress intended to discourage this type of repair through the small container limitations.

#### c. Equipment Certification.

(1) Equipment used in the recycling operation must meet standards at least as stringent as those developed by the Society of Automotive Engineers (SAE) in effect as of November 1990.

(2) The EPA standard includes machines that separate oil and remove moisture through single or multiple passes through moisture absorption devices.

(3) Currently, Underwriters Laboratory (UL) is certifying some recovery and recycle equipment. This equipment has been approved by EPA for recovery and recycling in mobile units.

(4) Small establishments or entities that do not perform a large number of MAC jobs may choose to purchase only the recovery equipment, send the refrigerant they recover to reclamation facilities, and purchase the CFC's they need to perform service.

(5) Noncondensable gases must be removed from refrigerant to prevent an unacceptable increase in system operating pressure and subsequent compressor damage.

(6) Recovery-only machines do not purge non-condensables from the refrigerant.

(7) Recycle machines must be able to separate the lubricant from recovered refrigerant and measure the amount of oil removed so that an equivalent amount of oil can be added at recharge.

(8) Any refrigerant sent off-site must actually be reclaimed to a higher level of purity in order to ensure it does not contain any contaminants that could be introduced from equipment other than MAC's (e.g., refrigerant from a home refrigerator may contain acids and this may not be introduced into an automobile until it has been reclaimed to the ARI-700 standard).

(9) An essential criterion for evaluation of equipment is that the equipment cleans refrigerant to the SAE 1991 purity standard.

#### d. Technician Training and Certification.

(1) EPA-approved standards are being developed for training and certification.

(2) Two organizations, to date, have been approved by the EPA to oversee and certify technicians. These organizations are: the Mobile Air Conditioning Society (MACS) and the International Mobile Air Conditioning Association (IMACA).

(3) These organizations presently provide booklets for self-training. Their test is an open-book, proctored examination for each technician.

(4) Some of these certifications are permanent, whereas others require recertification every 5 years.

(5) Each training program must provide one or more of the following components: on-the-job training; training through self study of instructional material; or on-site training involving instructors, videos, or hands-on demonstration.

(6) The certification test must cover the recommended service procedures for the containment of R-12, extracting and recycle equipment, and the standard of purity for refrigerant in MAC's.

(7) The tests should anticipate technological developments, such as the introduction of HFC-134a in new MAC's and the potential need to use blends as a substitute if CFC-12 is in short supply.

(8) It will be imperative that technicians be able to identify the different systems and keep the chemicals separate during servicing and recycling.

(9) It is necessary for service technicians to understand why recovering refrigerant is important from an environmental perspective. General regulatory requirements imposed by EPA under Section 609 of the CAA must also be included in the training program to ensure that technicians are familiar with the legal requirements regarding service.

(10) Completed tests must be sent to an independent testing authority for grading.

(11) EPA certification programs are not intended to ensure expertise in motor vehicle air conditioning repair. The program covers recycling of refrigerant during MAC repair, a subset of the knowledge required to perform effective service.

(12) Each certification program must provide individual proof of certification.

**e. Small Container Restrictions.** Effective November 15, 1992, it became unlawful for any person to sell or distribute, or offer for sale or distribution, any class I or class II substance suitable for use as refrigerant in MAC's in a container of less than 20 pounds except to certified technicians servicing MAC's for consideration (payment).

**f. Relationship to State Regulations.** The EPA regulation represents the Federal motor vehicle air conditioning recycling program, and States may establish programs more stringent in their requirements if they wish. In States without programs, or with programs having less stringent requirements, the Federal program takes precedence.

## **62. AIRCRAFT**

Maintenance practices on aircraft air conditioning systems are not presently regulated to the same requirements as for motor vehicle maintenance practices. However, it is unlawful to vent the R-12 from aircraft air conditioning systems into the atmosphere. The Office of Aviation System Standards shall develop revised maintenance procedures related to the recovery and recycling of CFC's related to air conditioning systems used on FAA-owned aircraft.

## **63.-69. RESERVED**

## CHAPTER 7. HALONS AND INDUSTRIAL SOLVENTS

### 70. GENERAL

a. Halons and many of the solvents and degreasers in use today are serious ozone depleters. Methylchloroform (1,1,1 trichloroethane) and carbon tetrachloride production will be phased out by 1995. Substitutes include terpene products, semi-aqueous hydrocarbons, and HCFC-blends which pose less harm to the ozone. Like substitute refrigerants, solvent substitutes have some limitations and are not as widely applicable as current CFC solvents. One company produces a solvent that contains hydrocarbons in a semi-aqueous solution. Applications of this substance must be compatible with water because the chemical leaves a residue which must be rinsed off with water. This company also produces two other solvents. One is a blend of CFC-113, methanol and dichloroethylene, and provides 25 percent less Ozone Depletion Potention (ODP) than CFC-113. It is viewed as a transitional substance, until a more suitable substitute is found. The other solvent (a metal cleaning agent) has an ODP that is 37 percent less than CFC-112 and is designed for metal cleaning applications (aluminum, steel, zinc, brass, and stainless steel).

b. The CAA calls for the phaseout of halons. Halon 1211, 1301, and 2402 are the three primary halons used today for fire extinguishers. FAA primarily uses halon 1211 in portable fire extinguishing units. Halon 1301 is used in total flooding fire protection systems. One company has recently been granted EPA approval to begin production and sale of a substitute for halon 1211. This substitute has an ODP of 0.19, which is significantly lower than the ODP of the currently used halons (approximately 10.0). In addition, it reportedly exhibits firefighting properties superior to halon 1211. This substitute can be used in portable and total flooding fire extinguishing systems. One company also has developed an alternative fire suppressant for portable and total flooding applications. These products are expected to be available within the next 5 years. The projected cost for the alternative for halon 1301 is two to three times the cost of halon 1301. The alternative for halon 1211 is expected to be similar in cost to halon 1211.

c. Halons cannot be released during the maintenance or recharging of systems. EPA's notice of proposed rulemaking would require halon recycling. The National Fire Protection Association believes recycling is technically feasible and economically beneficial. The halon removed from an extinguisher would be placed in a recovery cylinder and then either used or returned to the manufacturer for recycling. Recovery, recycling, and reuse of halon 1301 have also been proposed. EPA is considering

requiring users of halons to possess recycling equipment or have an established contract with an off-site recycler for reclaiming halon.

### 71. HALON TOTAL FLOODING SYSTEMS

a. Until an acceptable substitution can be developed, current halon total flooding systems will remain in place and be properly maintained.

b. The current maintenance practice of discharging halons into the atmosphere shall discontinue immediately.

c. Weighing the halon shall become the standard maintenance practice upon issuance of this order which shall supersede all testing procedures regarding "release under testing."

d. Regions, centers, and sectors shall investigate the use of halon substitute chemicals and convert to those chemicals when economically and technically practical. The intent is to reduce the inventory of halons in FAA total flooding systems.

### 72. HALON PORTABLE FIRE EXTINGUISHERS

a. Regions and centers shall phase out the use of halon portable fire extinguishers by replacing with appropriate substitute extinguishers or converting the present halons to a substitute chemical that has a lower ozone depletion rating. The intent is to reduce the inventory of halons used in portable fire extinguishers. Halon phaseout shall occur as acceptable substitutes become available. The availability of acceptable substitutes shall be announced by a headquarters memorandum.

b. On a cautionary note, fire extinguishers are designed for specific applications.

c. Do not make an arbitrary decision on replacing extinguishers.

d. Make sure the extinguisher matches the application. For example, in the Exide Corporation bulletin Section 58.00, section 1, paragraph O, the following statement is made: "CO-2 must not be used to extinguish battery fires since it will crack most plastic jars and/or covers. A recommended fire extinguishing system would be of the halon type." A cracked case could result in a sulfuric acid solution release.

e. Disposal of halons shall be in accordance with approved EPA procedures outlined in chapter 5 of this order.

**73. HALON SUBSTITUTES**

All halon substitutes shall meet OSHA standards for worker exposure protection. OSHA standards for fire suppressants currently in use (i.e., halons) are provided in appendix 6.

**74. CLEANING SOLVENTS**

a. Regions and centers shall phase out the use of cleaning solvents containing CFC's, carbon tetrachloride, and methyl chloroform whenever possible. The intent is to reduce the inventory of solvents that are known ozone depleters (specifically the class I chemicals).

b. Disposal shall be in accordance with approved EPA procedures outlined in chapter 5.

c. Spray cans containing CFC's or CFC solvents shall no longer be replaced as inventories are diminished. FAA personnel shall explore the use of viable alternatives to the use of spray cans containing CFC substances. When CFC spray cans are being disposed, the guidelines contained in chapter 5 shall be followed.

**74.-79. RESERVED**



## CHAPTER 8. REPORTING REQUIREMENTS

### 80. ANNUAL REPORT

Each region/center shall submit one CFC report as part of its annual facilities environmental compliance report to AEE-1 by February 15 of each calendar year. The data collected will be used to monitor the agency's inventory of CFC's, halons, and solvents. Each region/center shall develop a system for sectors and facilities to collect and report the required data on CFC, Halon, and Solvent Use and Procurement.

The Annual Facilities Environmental Program Activities Report (RIS 1050-1), as required by Order 1050.10B, will incorporate the data requirements specified in paragraph 81.

**81. SAMPLE ANNUAL CFC, HALON, AND SOLVENT REPORT FORMAT**

TO: AEE-1

FROM/DATE: \_\_\_\_\_

SAMPLE

Current Environmental Coordinator

**I. REFRIGERANT SYSTEMS/EQUIPMENT** (includes any system in storage or operation using refrigerant). Examples: air conditioning, heat pumps, waveguide pressurization, air driers, water coolers, refrigerators, etc.

	Type	Number of Units Using	Total Pounds of
1.	R-11	<u>4</u>	<u>3,200</u>
2.	R-12	<u>2</u>	<u>1,600</u>
3.	R-22	<u>250</u>	<u>600</u>
4.	R-113	<u>1</u>	<u>400</u>
5.	R-114	_____	_____
6.	R-115	_____	_____
7.	R-500	_____	_____
8.	R-502	_____	_____
9.	R-123	_____	_____
10.	* _____	_____	_____
11.	* _____	_____	_____

\* Note: If other refrigerant or solvent is used, write in the TYPE (use chemical name if known, trade name otherwise) as well as the number of units and total pounds.

**II. HALON SYSTEMS/EQUIPMENT** in use and storage:

Number of total flood halon systems	<u>8</u>
Number of portable halon extinguishers	<u>21</u>

Total pounds of halon	<u>7,350</u>
Total pounds of halon	<u>3,575</u>

**III. SOLVENTS**

	Number of Locations Using CFC Solvents	Total Pounds Used Per Year
1.	Carbon tetrachloride	_____
2.	Methylchloroform	_____
3.	Chlorofluoromethane	<u>25</u>
4.	Dichlorodifluoromethane	<u>70</u>
5.	Dichlorofluoromethane	<u>25</u>
6.	R-1150	<u>20</u>
7.	Trichlorodifluoromethane	<u>50</u>
8.	Trichloroethane	<u>6</u>
9.	Trichlorofluoroethane	<u>600</u>

**IV. PROCUREMENT/USAGE**

	Total Pounds of:	On Hand	Procured	Used
1.	R-11	<u>4,000</u>	<u>7,000</u>	<u>3,500</u>
2.	R-12	<u>300</u>	<u>90</u>	<u>50</u>
3.	R-22	<u>500</u>	<u>150</u>	<u>300</u>
4.	R-113	_____	_____	_____
5.	R-114	_____	_____	_____
6.	R-115	_____	_____	_____
7.	R-500	_____	_____	_____
8.	R-502	_____	_____	_____
9.	R-123	<u>200</u>	<u>500</u>	<u>500</u>
10.	Halon	_____	_____	_____
11.	Carbon Tet.	_____	_____	_____
12.	Methylchloroform	_____	_____	_____
13.	* _____	_____	_____	_____
14.	* _____	_____	_____	_____

**V. WAVEGUIDE SYSTEMS.** Total number of waveguide systems using refrigerant as pressurizing agent: 2

**VI. CHANGES TO EQUIPMENT INVENTORY.** Include a brief narrative explaining any changes to equipment that increased or decreased use of CFC/HCFC refrigerants, halon, or CFC solvent inventory. Also include any projects which used a CFC substitute chemical.

Examples:

1. Assumed ownership of county ATCT which uses 10 halon portable fire extinguishers totaling 50 pounds of halon.
2. Removed air conditioning systems from 9 VORTAC's. Recovered 90 pounds of R-22 for future use.

**82.-89. RESERVED**



## CHAPTER 9. HEALTH AND SAFETY

### 90. GENERAL

The primary threat to human health and safety from CFC's, HFC's, HCFC's, halons, and solvents such as carbon tetrachloride and methylchloroform, stems from the toxicity of some of these substances and the risk of injury from inhalation or the high pressurization under which some of these are used. Any personal contact with toxic substances or injury associated with their use shall be reported immediately to the Regional Flight Surgeon; the Manager, Occupational Health Division, AAM-700; or the Safety/Health Official; and/or the Industrial Hygienist for the local facility. Persons having contacted toxic substances shall contact the Regional Flight Surgeon for a physical.

### 91. SAFETY

Appropriate safety practices shall be followed when transferring refrigerant from equipment or system to a refrigerant container, when transporting refrigerant from one location to another, and when storing refrigerant. These precautions should ensure that employee exposure levels are maintained at or below OSHA's Permissible Exposure Limits (29 CFR 1910.1000). If effective administrative and/or engineering controls are not feasible to maintain exposure levels at or below the Permissible Exposure Limits, then appropriate respiratory protection should be worn in accordance with OSHA's Respiratory Protection Standard (29 CFR 1910.134).

### 92. REFRIGERANT HANDLING PRACTICES

a. Refrigerant shall be transferred only to a container that is suitable for the specific refrigerant involved. The container should be identified by color code or otherwise as being intended to hold the refrigerant involved, and shall comply with appropriate DOT regulations for refillable containers.

b. The container shall be examined externally and internally for corrosion or other damage that may weaken the walls, heads, or joints. The examination shall be undertaken before refrigerant is transferred.

c. The refrigerant container shall not be overfilled. The design maximum working pressure of the container shall not be exceeded, even temporarily, during any filling operation. The maximum working pressure of the container shall be stamped in the neck area of the cylinder/container. Refrigerant-oil mixtures have a lower density than refrigerants alone; the container capacity will therefore be reduced for a refrigerant-oil mixture.

d. In filling refrigerant containers, the maximum carrying capacity shall not be exceeded (approximately 80 percent liquid fill at 70 degrees fahrenheit or 21 degrees centigrade). The carrying capacity is a function of the internal volume of the container and the liquid density of the refrigerant at a reference temperature.

### 93. TANK SAFETY

No "throw away" tanks shall be used as "recycle tanks." Tanks that are not designed for recycling may rupture under different pressure levels causing injury to the technician.

### 94. HEALTH

a. **Exposure.** Due to health risks associated with prolonged exposure to certain substances, exposure levels shall be carefully monitored and controlled. Additionally, proper safety standards shall be implemented. Refer to ASHRAE Standard 15R. The key elements of those recommendations are:

(1) Use a refrigerant sensor capable of monitoring the appropriate refrigerant concentration levels,

(2) Use an alarm activated at a level not greater than the AEL,

(3) Use mechanical ventilation sized per ASHRAE Standard 15R, and

(4) Have at least one approved self-contained breathing apparatus located convenient to the equipment room for emergency use.

### 95.-99. RESERVED



## APPENDIX 1. STATUTORY AND REGULATORY REQUIREMENTS

**CLEAN AIR ACT (CAA) AMENDMENTS OF 1990.** Following is a summary of some Title VI provisions of the CAA Amendments of 1990:

- a. Production phaseout of CFC by December 31, 1995, along with three halons and carbon tetrachloride.
- b. HCFC production freeze in 2015, use limited to refrigerants for equipment manufactured prior to 2020, and elimination in 2030.
- c. Mandatory recapture, recycling, and safe disposal; regulations as of January 1, 1992.
- d. Mandatory use of certified recycling equipment when servicing motor vehicle air conditioning systems as of January 1, 1992.
- e. Prohibition of venting during appliance service, repair and disposal as of July 1, 1992.
- f. Restrictions on the sale of small cans of class I and class II refrigerants.
- g. Ban on non-essential uses of ozone depleting chemicals.
- h. Labeling requirement on product containers.
- i. Requirements for Federal agencies to modify procurement regulations in accordance with the requirements and policies of the CAA.
- j. A safe alternatives policy to promote the transition to safe substitutes.

**ENVIRONMENTAL PROTECTION AGENCY (EPA) REGULATIONS.** The passage of the CAA in 1970 marked the beginning of a new era of expanded Federal involvement in environmental regulation. Amendments to the CAA in 1977 included granting the EPA the authority to prohibit the use of CFC's in most aerosol applications. Since 1977, EPA has established several regulations that either eliminate or limit the use of CFC's.

(1) In order to implement the Montreal Protocol, EPA promulgated regulations under Section 157 of the CAA (40 CFR 82). This rule was promulgated on August 12, 1988. Regarding CFC manufacturing and importing as of January 1, 1990, CFC's are being taxed \$1.37 per ozone depletion weighted pound (\$3.00 per weighted kilogram). The tax will gradually increase to \$2.65 per weighted pound by 1994 and could reach \$5.35 per weighted pound by the year 2000. This tax is designed to stimulate the transition to alternative chemicals and technologies.

(2) On September 30, 1991, the EPA issued a proposed rule concerning the production and consumption of CFC's. This rule speeds up the phaseout schedule for ozone-depleting substances and establishes new criteria for trading allowances regarding these substances.

(3) The new CAA amendments were passed on October 26, 1990. Contained within the revised Act are several new provisions under Title VI-Stratospheric Ozone Protection. The EPA Administrator was required to publish (within 60 days after enactment of the CAA) an initial list of class I substances which contains a variety of CFC's and halons as well as carbon tetrachloride and methyl chloroform. Simultaneously with publication of the initial list of class I substances, the EPA Administrator was required to publish an initial list of class II substances which contains a variety of HCFC's. A phaseout schedule was developed for both classes of substances. Total phaseout of class I substances will occur by the year 2000 and for class II substances by the year 2015.

(4) Effective July 1, 1992, it became unlawful to vent any class I or class II substance used as a refrigerant in an appliance in a manner which permits the substance to enter the environment.

(5) No later than 18 months after the enactment of the CAA, the EPA Administrator shall promulgate regulations requiring each department, agency, and instrumentality of the U.S. Government to conform its procurement regulations to the policies and requirements of Title VI of the Act. No later than 30 months after the enactment of the CAA Amendments of 1990, each department, agency, and instrumentality of the U.S. Government shall so conform its procurement regulations and certify to the President that its regulations have been modified in accordance with the Act.

(6) On December 10, 1992, EPA issued proposed regulations under Section 608 of the Clean Air Act. EPA is proposing regulations that would require service practices that maximize recycling of ozone depleting compounds (both CFC's and HCFC's) during the servicing and disposal of air conditioning and refrigeration equipment; set certification requirement for reclaimers and for recovery and recycling equipment; and establish safe disposal requirements to ensure removal of refrigerants from goods that enter the waste stream with the charge intact.

**SUSPENSION OF THE TOXICITY CHARACTERISTIC RULE.** On March 29, 1990, the EPA promulgated revisions to the toxicity characteristic, one of several characteristics used to identify waste regulated as hazardous under Subtitle C of the Resource Conservation and

Recovery Act (RCRA). The Toxicity Characteristic (TC) is used to identify solid wastes which are identified as hazardous based on the presence of constituents that may leach from the waste. The TC expanded the range of wastes subject to Subtitle C (hazardous waste) controls. Two of the new TC constituents may be present in certain used refrigerants (e.g., those containing CFC-11) and are likely to leach from the new waste. The two constituents which are of concern in CFC-11 are carbon tetrachloride and chloroform.

On February 13, 1991, EPA issued an interim final rule that suspended the new toxicity characteristic rule for used refrigerants which exhibit the toxicity characteristic and which are recycled. The reason for this rule was concern that subjecting used CFC refrigerants to Subtitle C regulations would promote continued or increased venting. See the definition of solid waste in chapter 1 which includes "contained gaseous materials." Uncontained gases not associated with solid waste management units are outside of RCRA, thus the incentive for venting. Venting became illegal as of July 1, 1992.

**Presidential announcement of U.S. acceleration of the phaseout of ozone depleting substances.** On February 11, 1992, then President Bush announced that the United States will unilaterally accelerate the phaseout of substances that deplete the earth's ozone layer. This announcement was made in light of recent scientific evidence obtained by NOAA and NASA studies indicating that ozone depletion in the northern and temperate latitudes is much worse than it was originally thought to be. The President stated that all production of these substances—major chlorofluorocarbons (CFC), halons, methylchloroform, and carbon tetrachloride—will be eliminated in the United States by December 31, 1995. The EPA will adjust the existing phaseout schedule for these substances in order to comply with this deadline. A copy of the President's announcement is in this appendix.



## APPENDIX 2. CFC's AND CFC ALTERNATIVES

**CFC's:** CFC's are extremely stable, nontoxic, nonflammable, noncorrosive, and thermally efficient chemicals that are widely used as coolants for refrigeration and air conditioning systems, cleaning agents for electronic components, foam blowing agents, and propellants for aerosol sprays. CFC emissions occur when servicing CFC equipment or as a result of leaking refrigeration systems. These substances have been shown to significantly deplete the earth's ozone layer. Thus, venting or accidental release of these substitutes into the atmosphere must be prevented.

**CFC Alternatives:** Industry has been putting forth an aggressive effort to find alternative chemicals to replace the ozone-depleting CFC's currently used as refrigerants and solvents. Only a few years ago, 600 different compounds were being researched as potential CFC substitutes. The list has now been narrowed down to fewer than ten. Various refrigerants are being considered as CFC replacements. They include halocarbons (HCFC's and HFC's) and helium, as well as more traditional refrigerants, such as ammonia and propane. For instance, HFC-134a is designed to replace R-12 and HCFC-123 will replace R-11. In addition to HCFC's and HFCs, other substitutes are being explored. However, preliminary tests indicate that these substitutes have significant limitations. Thus, in choosing alternatives to existing CFC's, caution must be exercised and the cost and limitations of the substitute must be carefully explored.

**Cost:** In general, the new substitutes will have a higher cost than current CFC's. This is due to greater costs in designing and operating plants that will manufacture substitutes. Nevertheless, the cost of CFC's will continue to rise due to the tax imposed by the Government, thereby making the substitutes more economically practical.

**Product Limitations:** All potential replacement refrigerants are still being tested to find answers to a variety of concerns. Issues such as cost, availability, toxicity, efficiency, material compatibility, and feasibility of recycling must be considered. Material compatibility is a problem with new refrigerant substitutes such as R-123, R-124 and R-134a. These chemicals may deteriorate machinery components such as gaskets, seals, motor windings, or insulation. Many of the new refrigerants (e.g., both R-123 and R-134a) have exhibited aggressive solvent properties. It has already been found that most gasket and seal materials are not compatible with R-123, and new seal materials are being tested. For chillers with hermetic compressors, the motor windings also come into contact with the refrigerant, and the new refrigerants have been found to have deteriorating effects on the motor insulation. In addition, some substitutes such as R-134a are incompatible with lubricating oils used in equipment.

**Compatibility Requirements for CFC Alternatives:** At a minimum, all CFC substitutes should be thoroughly analyzed for potential system incompatibility in terms of corrosivity, lubrication effects, and pressure disparities.





